

33. The catalyst system of Claim 17 wherein the particle support comprises silica.
34. The catalyst system of Claim 17 wherein the supported catalyst is a homogeneous supported catalyst.
35. The catalyst system of Claim 17 wherein the metal complex is a first row metal complex.
36. The catalyst system of Claim 17 wherein the bidentate ligand structure comprises a bridging element and wherein the bridging element has at least one conjugated group.
37. The catalyst system of Claim 17 further comprising an organoaluminum compound.
38. The catalyst system of Claim 37 wherein the organoaluminum compound is an alumoxane.
39. The catalyst of Claim 38 wherein the catalyst-precursor-to-alumoxane molar ratio is from 1:500 to 10:1.
40. The catalyst system of Claim 17 wherein the metal of the metal cation is Ni.

REMARKS

Please reconsider this application based on the amendments and following remarks.

- Claims 1, 6, 13, 17-20, 22-27, 30, and 33-40 are pending in this Application.
- Claims 1, 6, and 13 are rejected.

- Claims 1, 6, 13, 17-20, 22-27, 30, and 33-40 are subject to a restriction requirement.

For the reasons that follow, all claims are in condition for allowance.

Paragraph 1

No response necessary.

Paragraph 2

In the most recent Office Action on the merits, prior to the current Office Action, the Examiner acted on claims 17-20. Therefore, those claims must not have fallen under the restriction requirement of October 6, 1998. The Examiner is invited to act on claims 17-20 or to issue a new restriction requirement detailing why the examination of claims 17-20 should not continue.

Paragraph 3

On October 6, 1998, the Examiner objected to the abstract. (see paragraph 7 of the October 6, 1998 Office Action). On March 29, 1999, the Examiner once again objected to the abstract, but for a different reason. (see paragraph 4 of March 29, 1999 Office Action). The Examiner dropped abstract-based objections for the next substantive Office Action. (November 3, 2000 Office Action). Finally, in the current Office Action, the Examiner makes yet another abstract-based objections

The abstract as it stands meets the requirements of MPEP §608.01(b).

Paragraph 4

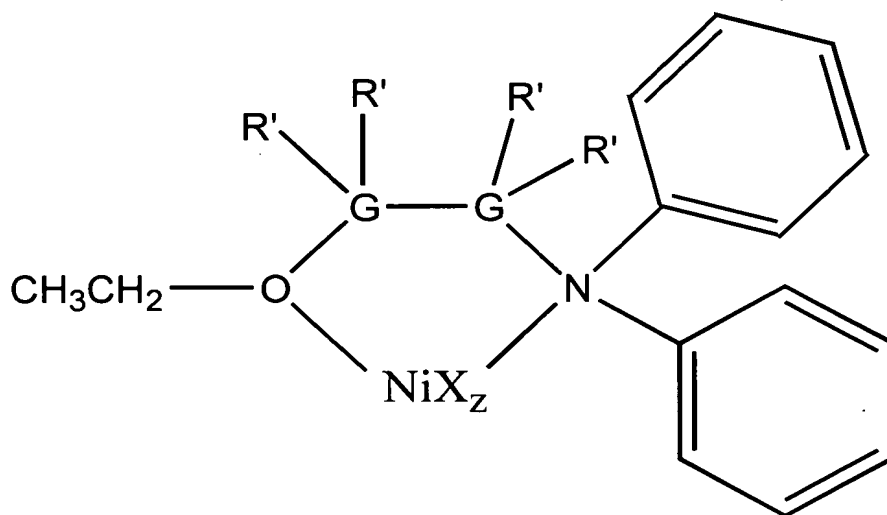
--or-- has been added as the Examiner requested. "the oxidation state being satisfied" has been amended to clarify its meaning. These changes do not add new matter.

Paragraphs 5 and 6

These paragraphs do not make sense, as written. Group-15 elements bond to three different elements all the time: NH_3 . On the other hand, if the Examiner means Group-16 elements instead, he seems to be excluding "coordination" from the term "covalent". The International Union of Pure and Applied Chemistry defines "covalent" as a region of relatively high electron density between nuclei which arises at least partly from sharing of electrons and gives rise to an attractive force and characteristic internuclear distance. It defines "coordination" as the formation of a **covalent** bond, the two shared electrons of which have come from only one of the two parts of the molecular entity linked by it. (See Appendix B for photocopies of the relevant dictionary pages.)

In any case, the following ligand shows that m and n need not be 0.

- Bridging group A = A-3 from page 3 of the application as filed;
- First E = O (Group-16);
- First R = ethyl; m = 1;
- Second E = N (Group-15);
- Second R = phenyl; n = 2.



(See also Appendix C showing a variety of Group-15 and 16 atoms in donor-acceptor interactions, i.e., covalent bonds. As can be seen in the appendix, Group-15 and -16 atoms form a variety of 2-, 3-, and 4-coordinate interactions that are covalent. The coordination number is indicated next to selected atoms, placed in side of a box.)

In the ligand drawn above, oxygen and nitrogen are coordinating to nickel. This type of bonding has been called dative, although "dative" is obsolete. Whatever it is called, this interaction is a covalent one. Coordinating to nickel means that a covalent bond has been formed.

The overall electrical neutrality of the molecular species does not constrain the identity of E further than as recited in the claims.

Paragraph 7

Applicants thank the Examiner for his suggestion of a CIP for this case, but as shown above, Applicants' formula, as claimed, in fact does not suffer from the problems pointed out in the Office Action.

Applicants thank the Examiner for his indication of allowable subject matter. Since all claims are in condition for allowance, please issue a Notice of Allowability so stating.

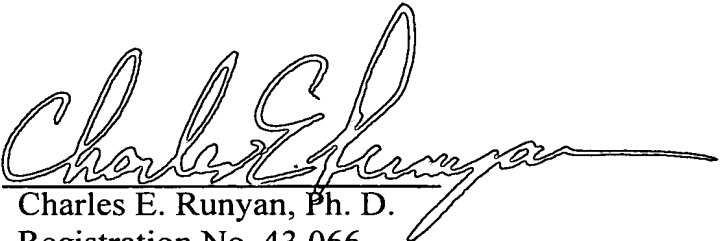
If you can think I can be of further help, please contact me.

Respectfully submitted,

April 1, 2002

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APPENDIX A

MARKED-UP CLAIMS



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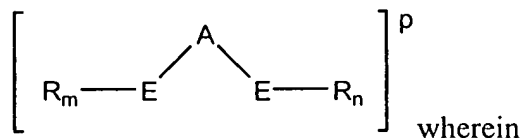
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four

1. (Amended ~~three~~ *four* times) A late transition metal catalyst precursor for olefin polymerization comprising a Group-9, -10 or -11 metal connected to a bidentate ligand immobilized on a solid support where the late transition metal loading is less than 100 micromoles transition metal compound per gram of solid support, wherein the catalyst precursor has the formula:

LMX_r , wherein

- (a) M is a Group 9, 10 or 11 metal;
- (b) L is a bidentate ligand defined by the formula:

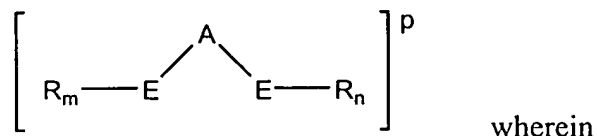


- (i) A is a bridging group containing a Group 13-15 element;

- (ii) each E is independently a Group 15 or 16 element covalently bonded to M;
- (iii) each R is independently a C₁-C₃₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, *↳ or* halocarbyl-substituted organometalloid,
- (iv) m and n are independently 1 or 2 depending on the valency of E; and
- (v) p is the charge on the bidentate ligand such that the ~~oxidation state of M~~ *overall charge of LMX_r is neutral* ~~is satisfied~~;
- (c) each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a univalent anionic ligand; a neutral hydrocarbyl-containing donor ligand; a neutral non-hydrocarbyl atom containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from 2 to 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and
- (d) r is 1, 2 or 3. *for*
6. (Amended ~~three~~ times) A late transition metal catalyst precursor for olefin polymerization comprising a Group -9, -10 or -11 metal connected to a bidentate ligand immobilized on a solid support, wherein the catalyst precursor has the formula:

LMX_r wherein

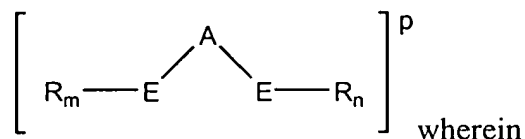
- (e) M is a Group 9, 10 or 11 metal;
- (f) L is a bidentate ligand defined by the formula:



- (i) A is a bridging group containing a Group 13-15 element;
 - (ii) each E is independently a Group 15 or 16 element covalently bonded to M;
 - (iii) each R is independently a C₁-C₃₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, halocarbyl-substituted organometalloid, *or*
 - (iv) m and n are independently 1 or 2 depending on the valency of E; and
 - (v) p is the charge on the bidentate ligand such that the ~~oxidation state of MX_r is satisfied;~~ *overall charge of LMX_r is neutral;*
 - (g) each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a univalent anionic ligand; a neutral hydrocarbyl-containing donor ligand; a neutral non-hydrocarbyl atom containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from 2 to 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and
 - (h) r is 1, 2 or 3.
13. (Amended *four* ~~three~~ times) A late transition metal catalyst precursor, essentially without residual solvent, for olefin polymerization comprising a Group -9, -10 or -11 metal connected to a bidentate ligand immobilized on a solid support, wherein the catalyst precursor has the formula:

LMX_r wherein

- (a) M is a Group 9, 10 or 11 metal;
- (b) L is a bidentate ligand defined by the formula:



- (i) A is a bridging group containing a Group 13-15 element;
- (ii) each E is independently a Group 15 or 16 element covalently bonded to M;
- (iii) each R is independently a C₁-C₃₀ radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, *or* halocarbyl-substituted organometalloid;
- (iv) m and n are independently 1 or 2 depending on the valency of E; and
- (v) p is the charge on the bidentate ligand such that the ~~oxidation state of MX_r is satisfied;~~ *overall charge of LMX_r is neutral.*
- (c) each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; a neutral hydrocarbyl-containing donor ligand; a univalent anionic ligand; a neutral non-hydrocarbyl atom containing donor ligand; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from 2 to 20 carbon atoms; or two Xs are joined to form an anionic chelating ligand; and
- (d) r is 1, 2 or 3.

17. (Amended three times) A catalyst system wherein the catalyst precursor of Claim 1, 6, or 13 has been treated with a noncoordinating anion precursor to form a catalyst comprising a metal cation and a noncoordinating anion.
18. The catalyst system of Claim 17 wherein the noncoordinating anion is tetrakis(perfluorophenyl)boron.
19. (Amended Three Times) The catalyst system of Claim 17 wherein the noncoordinating anion precursor is a halide salt of Group-13-16 metals or metalloids.
20. (Twice Amended) The catalyst system of Claim 19 wherein the catalyst-precursor-to-noncoordinating-anion-precursor molar ratio is from 10:1 to 1:10.
22. (Amended Once) A polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C₃-C₂₀ olefin, C₄-C₂₀ cyclic olefin, C₄-C₂₀ non-conjugated diolefin, C₈-C₂₀ aromatic substituted olefin, C₄-C₂₀ gem-substituted olefins, or C₂₀-C₁₀₀₀ olefin macromer with a catalyst system of Claim 17.
23. (Amended Once) The polymerization process of Claim 22 comprising conducting the contacting step under gas phase polymerization conditions.
24. (Amended Once) The polymerization process of Claim 23 wherein the reactor temperature is from -100 °C to 150 °C and at a pressure up to 7000 kPa.
25. The polymerization process of Claim 24 additionally comprising a scavenging compound.
26. (Amended Once) The polymerization process of Claim 22 comprising conducting the contacting step under slurry polymerization conditions.
27. The polymerization process of Claim 26 wherein the reactor temperature is from 0 °C to 150 °C and at a pressure from 0.76 MPa to 4.8 MPa



30. (Amended Twice) The catalyst system of Claim 17 wherein LMX_r has a square planar geometry.
33. (New) The catalyst system of Claim 17 wherein the particle support comprises silica.
34. (New) The catalyst system of Claim 17 wherein the supported catalyst is a homogeneous supported catalyst.
35. (New) The catalyst system of Claim 17 wherein the metal complex is a first row metal complex.
36. (New) The catalyst system of Claim 17 wherein the bidentate ligand structure comprises a bridging element and wherein the bridging element has at least one conjugated group.
37. (New) The catalyst system of Claim 17 further comprising an organoaluminum compound.
38. (New) The catalyst system of Claim 37 wherein the organoaluminum compound is an alumoxane.
39. (New) The catalyst of Claim 38 wherein the catalyst-precursor-to-alumoxane molar ratio is from 1:500 to 10:1.
40. (New) The catalyst system of Claim 17 wherein the metal of the metal cation is Ni.